SECTION 3
SANITARY SEWER DESIGN

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SECTION 3
SANITARY SEWER DESIGN

3.1 GENERAL DESIGN CRITERIA

3.1.1 Requirement for Sanitary Sewer

All sanitary sewage of domestic and other water borne wastes shall be collected and conveyed in a sanitary sewer pipe system to a point of discharge into an existing sanitary sewer system, City of Naperville interceptor, or sewage treatment plant. No sanitary sewage shall be allowed to enter any storm sewer system or discharge onto the ground or into receiving streams without first being treated in accordance with city, county, state and federal regulations.

3.1.2 Design Approval

The Department of Public Utilities shall approve all designs and shall alter the following design requirements as necessary to meet the City Utilities Master Plan. The Department of Public Utilities and the Transportation Engineering and Development Business Group shall review and comment on all designs.

Proposal of new sanitary sewer lift stations requires approval from the Director of Public Utilities, prior to the design and review process.

The City of Naperville's standard details, as currently adopted by the Department of Public Utilities, should be used in all construction plans. Any modifications to these standard details require approval from the Director of Public Utilities.

3.1.3 IEPA Permit Required

All public sanitary sewer mains require an IEPA Construction permit number and an Illinois Pollution Control Board permit number, prior to construction. Some private extensions may require a permit, dependent upon the design population equivalent.

3.1.4 Differentiation Between Public and Private Sanitary Sewers

Those portions of the sanitary sewer system that are located within the public right-of-way are the responsibility of the City. The City shall also maintain public mains, serving more than one customer. The maintenance and repair costs for the sanitary sewer system located on private property, beyond the limits of the right-of-way, are the responsibility of the property owner or property owner's association depending on the associate's covenants and guidelines. In such cases where the City performs maintenance or repairs on the private sanitary sewer system, the City reserves the right to charge the property owner for necessary work.

All engineering plans shall clearly differentiate between public and private sanitary sewers.

3.1.5 Easements

All public sanitary sewers that are not located within a publicly dedicated right-of-way shall be placed in a public utility and drainage easement, minimum 15 feet wide or as directed by the Department of Public Utilities, to the City of Naperville. The easement shall be granted to the City either through a recorded plat of subdivision or a recorded plat of easement. The City shall be granted access to these easements if not directly adjacent to public right-of-way.

At the discretion of the Director of Public Utilities, the City may require additional easements for future maintenance or repair of sanitary sewers, even those sewers that may be located within the

public right-of-way. For example, the City may have an extra deep sanitary sewer located within the public right-of-way. However, the City may require a public utility and drainage easement parallel to the edge of the right-of-way to accommodate future repair of the sanitary sewer if it ever needs to be excavated and repaired.

3.2 SANITARY SEWERS

3.2.1 Sanitary Sewer Pipe Materials

All sanitary sewer pipe materials and appurtenances shall be in conformance with Section 302 of the City of Naperville Standard Specifications.

3.2.2 Location in the Public Right-Of-Way

Sanitary sewers shall be located within the public right-of-way as directed by the City Engineer. In general, sanitary sewers shall be located 7.5 feet inside the right-of-way on the south and east sides of the right-of-way.

3.2.3 Curvilinear Alignment of Sanitary Sewers

Curvature of sanitary sewers is allowed for sewers 8 inches to 12 inches in diameter. Alignments must follow the general alignment of streets. Only a simple curve design is acceptable. The minimum allowable radius of curvature is 300 feet. Compression type pipe joints are required and manholes are required at the beginning and end of all curves. Maximum joint deflection shall not exceed the manufacturer's recommendations.

3.2.4 Sewer and Water Main Separation

Sanitary sewers and services that are laid in the vicinity of pipelines designated to carry potable water shall meet the conditions set forth in Section 5 of this manual.

3.2.5 Depth of Pipe Cover

All pipe shall be laid to a minimum depth of 7 feet measured from the proposed ground surface to the top of the pipe, unless specifically allowed otherwise in special circumstances by the Director of Public Utilities. If allowed, sanitary sewer and services with ground cover less than 4 feet or more than 25 feet must be constructed of ductile iron class 50 pipe with polywrap. All sanitary sewers and services with less than 4 feet of cover shall be insulated with a 2-inch exterior grade rigid insulation board. The insulation shall have a minimum R-value of R-9, and comply with ASTM C 578-92 Type 1X.

3.2.5.1 Overhead Sewers

The City reserves the right to require overhead sewers, dependent upon the depth of the main and the loading.

3.2.6 Sanitary Sewer Sizing

Sewer size shall be designed on the basis of a design average flow of not less that 100 gallons per capita per day and provide a minimum of 2.0 feet per second velocity when flowing full. The Director of Public Utilities may increase sewer size in accordance with Section 3.2.7 noted below. In no case shall a public sewer be sized less than 8 inches in diameter.

3.2.7 Oversizing and Extra Depth Requirements

The Director of Public Utilities may request that sanitary sewers either be oversized or installed at an additional depth in order to provide service to additional benefiting properties. Section 7-3-6 of the Municipal Code (City participation in construction of public improvements) outlines the City's policy relative to cost sharing for oversizing and extra depth installation.

3.2.8 Sanitary Sewer Slopes

All sanitary sewer slopes shall meet the requirements of the following sections**:**

3.2.8.1 Minimum Slopes

Sanitary sewers shall be designed such that the minimum slopes are not less than the following:

Pipe Diameter	Minimum Slope	Desired Slope
6 inch	1.00%	1.00%
8 inch	0.40%	0.45%
10 inch	0.28%	0.30%
12 inch	0.23%	0.25%

3.2.8.2 Maximum Slopes

Sanitary sewers shall be designed such that the slopes do not exceed a maximum of 12%. If the sanitary sewer system cannot be designed without exceeding a slope of 12%, then drop manhole assemblies shall be utilized.

3.2.8.3 Last Run of Manhole Sets

On last runs of all manhole sets, a minimum 1% slope needs to be provided in order to provide adequate flushing due to low flows.

3.2.9 Limits of Installation

At a minimum, sewers shall extend across the frontage of the property, at the developer's cost, such that a connection can be made with minimal disturbance in the future. In some cases, the City may require that the sanitary sewer be installed from one corner to the diagonally opposite corner, at the developer's cost.

3.3 SANITARY SEWER MANHOLES

Manholes for sanitary sewers shall have a minimum inside diameter of 48 inches and shall be constructed of pre-cast concrete units in accordance with ASTM C 478 and Section 32 of the "Standard Specifications for Water and Sewer Main Construction in Illinois," and shall follow the City of Naperville sanitary sewer standards.

3.2.2 Manhole Location and Spacing

Manholes shall be located at the junction of two sanitary sewer pipes or at any change in grade, alignment or size of pipe. The maximum spacing of manholes shall be 500 feet, or as approved by the Director of Public Utilities.

In general, the City of Naperville prefers to minimize the number of manholes needed for a project. This will help reduce future operation and maintenance costs.

3.2.2 Invert Elevations in Manholes

Inverts of similar size pipe are to match other inverts. Where a smaller pipe intersects a larger pipe, the spring line or top of pipe of both pipes shall be at the same elevation, unless otherwise directed by the Director of Public Utilities. This is also to be done when tapping (core and boot required) into an existing manhole.

3.2.2 Drop Manholes

Drop manhole assemblies shall be provided at the junction of sanitary sewers where the difference in grade is in excess of 2 feet. The drop assembly shall follow Naperville Standards with filleted inverts. Drops are to be made outside of the structure unless otherwise approved by the Naperville Department of Public Utilities. A minimum of 24 inches between the inverts of the drop assembly must be provided. If the difference between the inverts is less than 24 inches, the inverts must match.

When pipe inverts in a manhole do not meet the requirements of section 3.3.2, a drop manhole assembly shall be used.

3.2.2 Requirement for Inspection Manholes and Clean-Outs

All commercial, office, institutional, industrial, and manufacturing buildings shall have an inspection manhole located outside of the building that will allow the City to observe the discharge from the building into the public sanitary sewer system.

An inspection manhole is required for any multi-family building that has more than six (6) units. Additionally, clean-outs shall be required on multi-family services serving between two (2) and six (6) units.

A clean-out will also be required for any service line over 90 feet in length which does not have an inspection manhole.

3.3.5 Grease/Oil/Sand Trap Manholes

Grease/oil/sand trap manholes, as required by the Illinois Plumbing Code, shall be shown on the engineering plans.

3.3 APPURTENANCES

3.4.1 Casing Pipes

Manufactured non-metallic or non-corrosive casing spacers, adjustable runners, or cradles shall be used to support the pipe in the casing. A minimum of two supports shall be used per pipe for lengths up to 12.5 feet, and a minimum of three supports shall be used for lengths greater than 12.5 feet, or per manufacturer's recommendation. The annular space shall be filled with pea gravel or as required by permitting agency, and provisions shall be made so that no voids are left to prevent flotation.

3.4.1.1 Casing Pipe Material

The steel casing pipe shall be bituminous coated, a minimum of 30 mils thickness inside and out, and shall be of leak proof construction, capable of withstanding the anticipated loadings. The steel casing pipe shall have a minimum yield strength of 35,000 psi and shall meet the requirements of ASTM A139, Grade B. Ring deflection shall not exceed 2% of the nominal diameter. The steel casing pipe shall be delivered to the jobsite with beveled ends to facilitate field welding.

Steel Casing Diameter	Minimum Wall Thickness (Inches)
20" and 22"	0.344
24"	0.375
28"	0.438
30"	0.469
32"	0.501
34" and 36"	0.532

3.4.1.2 Sizing of Casing Pipes

The diameter of the casing pipe shall be a minimum of 12 inches greater than the outside nominal diameter of the sewer.

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